REMARKS

Claims 1, 2, 4, and 6-8 are pending in the application. Claim 8 is amended to correct an obvious grammatical error. The amendment to claim 8 does not raise any issues requiring further searching and fully responds to the rejection under 35 U.S.C. § 112, ¶2, so its entry is respectfully requested. Applicants request reconsideration and allowance of all claims in view of the following remarks.

Claims 1, 2, 4, and 6-8 are again rejected under 35 U.S.C. § 103(a) as being unpatentable over Mase et al., U.S. Patent No. 4,861,456, in view of Suzuki et al., U.S. Patent No. 4,177,112. Applicants again traverse this rejection based on data disclosed in the article "High Purity/Fine Alumina" of Sumitomo chemical Co., Ltd., previously submitted, and the newly presented article "Development of Advanced Alumina 'SUMICORUNDUM'" by Masahide Mohri et al. of Tsukuba Research Laboratory.

First, with respect to the relationship the Examiner asserts necessarily exists between particle size and sintering density, as indicated in the article "High Purity/Fine Alumina," the mean particle size for AKP-3000 is 0.55 μm, not 0.66 μm as the Examiner has misread the value to be. This is shown clearly in the attached, non-faxed copy of that article, which Applicants' representatives did not receive until after the previous Amendment had been filed with a faxed copy of the article, in which the value of 0.55 reasonably could be misread as 0.66. Thus, as Applicants have been asserting, AKP-3000 has a smaller mean particle size than AKP-20, yet has a larger porosity (smaller density) than AKP-20.

Moreover, Applicants note that

(1) alumina has an absolute specific gravity of 3.96; and

(2) porosity is equal to (1-Fired Density)/3.96.

From this and the "Effect of Firing Temperature on Fired Density" graph, the following relationship can be seen to hold true for the porosities of the respective samples at, e.g., a temperature of 1,600°C:

$$\text{AKP-3000} > (\text{AKP-20} = \text{AKP-30}) \qquad \text{(Eq. 2)}$$

Therefore, again, contrary to the Examiner's argument/assumptions, it cannot be concluded that a sample having a larger mean particle size will, in fact, have a larger porosity.

The Examiner conjectures that sample AKP-53 in the Firing Temperature Graph is supposed to be AKP-50 and, based on that assumption and particle size range information for AKP-50, draws certain conclusions as to the relationship between specific particle size and porosity. Applicants respectfully submit that such conjectural arguments are completely inappropriate in the context of trying to prove or disprove the Examiner's and Applicants' relative arguments; neither Applicants nor the Examiner can draw any conclusion with respect to AKP-50 or AKP-53 because there is simply insufficient data presented with which to do so.

Furthermore, Applicants are enclosing with this Response another published scientific article, entitled "Development of Advanced Alumina 'SUMICORUNDUM.'" As has been explained to Applicants' representative -- a copy of a translation of the relevant portion of the article is attached -- this article notes a relationship between particle size and sintering density. In particular, according to the description on page 11 of the article, the speed of the

sintering reaction is dependent on the particle size, and the sintering reaction advances quickly when the particle size is small. When the particle size distribution is spread over a wide range (i.e., when particle size is nonuniform), however, the sintering reaction begins with relatively small particles randomly and locally, thereby causing unevenness and resulting in residual voids or bulky particles (i.e., higher porosity). Therefore, the authors of this article emphasize that using particles having uniform or homogeneous size is key to avoiding the formation of residual voids or bulky particles which can cause the sintered body to have poor properties. According to the article, with SUMICORUNDUM, higher sintering density (i.e., lower porosity) than AKP can be obtained, despite the fact that the particle size of SUMICORUNDUM is larger than that of AKP.

Thus, Applicants have demonstrated clearly that, contrary to the Examiner's assertion, larger particle size does not necessarily imply larger porosity (and vice-versa). Thus, Applicants have disproved the Examiner's argument, and the rejection should be withdrawn.

Secondarily, the Examiner has been relying on Suzuki et al., U.S. Patent No. 4,177,112, for its disclosure of a layer having one particle size being juxtaposed to a layer having a larger particle size. As the Examiner asserts in the Interview Summary, "the function of the Suzuki layer is irrelevant [because] Suzuki is merely relied on to show [the] concept of large particles." Similarly, the Examiner states in the outstanding Office Action (emphasis added) that

> Suzuki is merely cited for the purpose of showing that one of ordinary skill in the art would select a particle size for a layer larger than the particle size of an adjacent layer if he desires to have a larger porosity than that of the adjacent layer. What difference does it make whether the layer involved is an inner layer or an outer layer, since that does not affect the premise of larger particle size for greater porosity?

The Examiner has failed to make a proper rejection under 35 U.S.C. § 103 for at least two reasons. First, the Examiner's argument starts with the premise that one having skill in the art already would desire to have a larger porosity than that of the adjacent layer. In other words, the underlying assumption of this argument is precisely that which Applicants themselves have taught, and therefore the argument begs the question. Clearly, it is based on improper hindsight.

Second, the context in which features found in a secondary reference are being used certainly is relevant to whether one having skill in the art would have combined those features with the primary reference. Otherwise, by extension of the Examiner's reasoning (admittedly to the absurd to make the point), one could argue, for example, that a sidewalk next to a street could be combined with the primary reference (Mase et al.) because the porosity of the cement from which the sidewalk is made is greater than the porosity of the cement from which the street is made, despite the fact that streets and sidewalks have nothing to do whatsoever with the primary reference.

In this case, the layers in Suzuki on which the Examiner is relying are formed by depositing particles -- not sintered -- and provide a protective outer layer on the sensor body -- a structure which is significantly different than the boundary layer recited in the present claims such that it would not have been used as a model based on which to construct the present invention. By his own virtual admission, the Examiner has simply "gone shopping" for a reference to supply the "missing ingredient" from the claim "recipe," and such an approach -- cobbling together references without meaningful rhyme or reason -- clearly is driven by inappropriate hindsight. There is no motivation other than such hindsight

for one having skill in the art to have adapted the Mase sensor to have layers with differential porosity, as asserted by the Examiner, and the rejection should be withdrawn.

In view of the foregoing, Applicants assert that all claims are in condition for allowance, and timely notice to that effect therefore is respectfully requested.

Respectfully submitted,

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